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School of Medicine

Hidden Issues in Implementing Healthcare Technology

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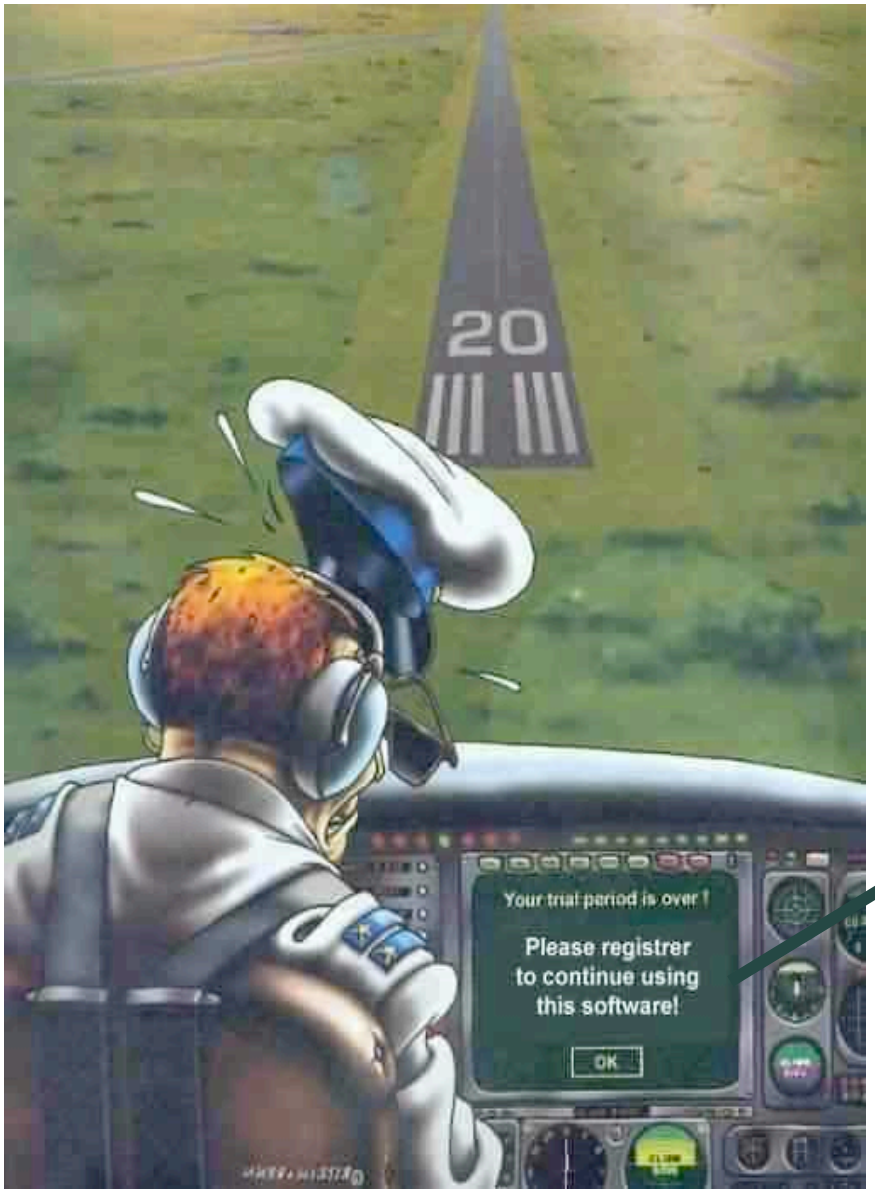

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The Promised Benefits of HIT

- **Evidence-based care delivered effectively (correctly and reliably), on time, cost efficiently, and in a way that is most satisfying to patients and providers.**
- **Complete documentation that is accurate, accessible, and secure.**
- **Seamless interconnectivity and communication.**
- **Real-time decision support.**

Case Studies

- **Silly Failure: A suppository was incorrectly labeled manually in the central pharmacy with the barcode for an eye ointment. The nurse trying to administer "ointment" to a patient's eye noticed the error.**
- **Serious Failure: A software bug led to excessive network traffic among a hospital's automated dispensing machines. The resulting slow response made the devices appear inoperative. In the emergency room, a patient had a cardiac arrest and resuscitation drugs could not be accessed. An orderly ran to the pharmacy to obtain the essential drugs.**
- **Catastrophic Failure: A software bug in a large complex automated dispensing robot in a regional outpatient pharmacy resulted in 25,000 medication bottles being mailed to patients. The bottles contained the correct labels but the wrong medications.**

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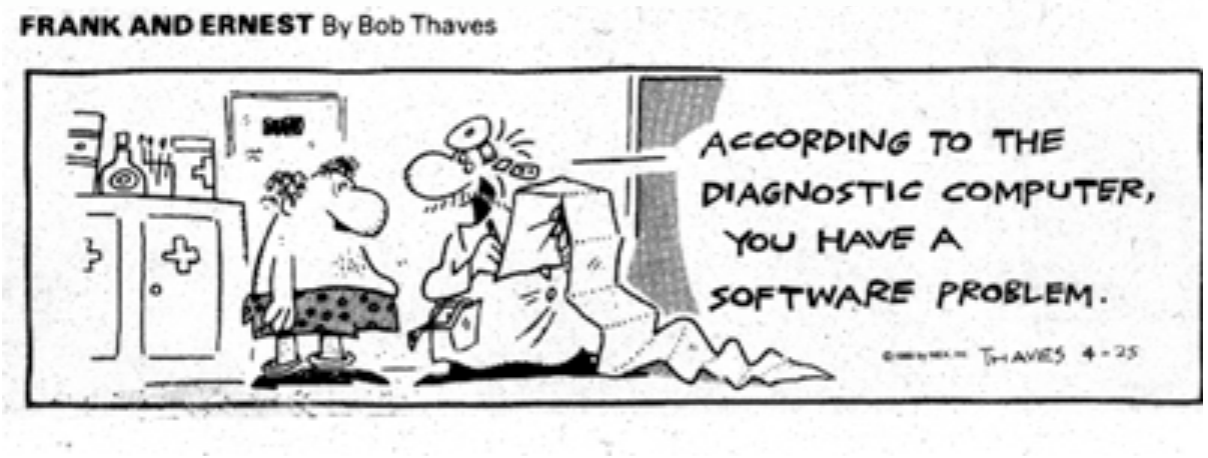
Why has HIT not delivered?

Simple Answers

- **It's too soon!**
- **Not enough money!**
- **Lack of interconnectivity**
- **Lack of standards**
- **Technology still immature**



- **Software engineering is still an immature science.**
- **HIT software systems are very complex (millions of lines of code) and thus prone to insidious bugs.**
- **Interaction with healthcare systems and processes creates multiple latent failures.**

Why has HIT not delivered?

Deeper Answers

- **Incomplete automation leaves gaps: Current HIT not good partners in the care process.**
- **Inadequate investment in implementation.**
- **Under-appreciated disincentives.**
- **Inadequate human factors engineering.**

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HIT Implementation

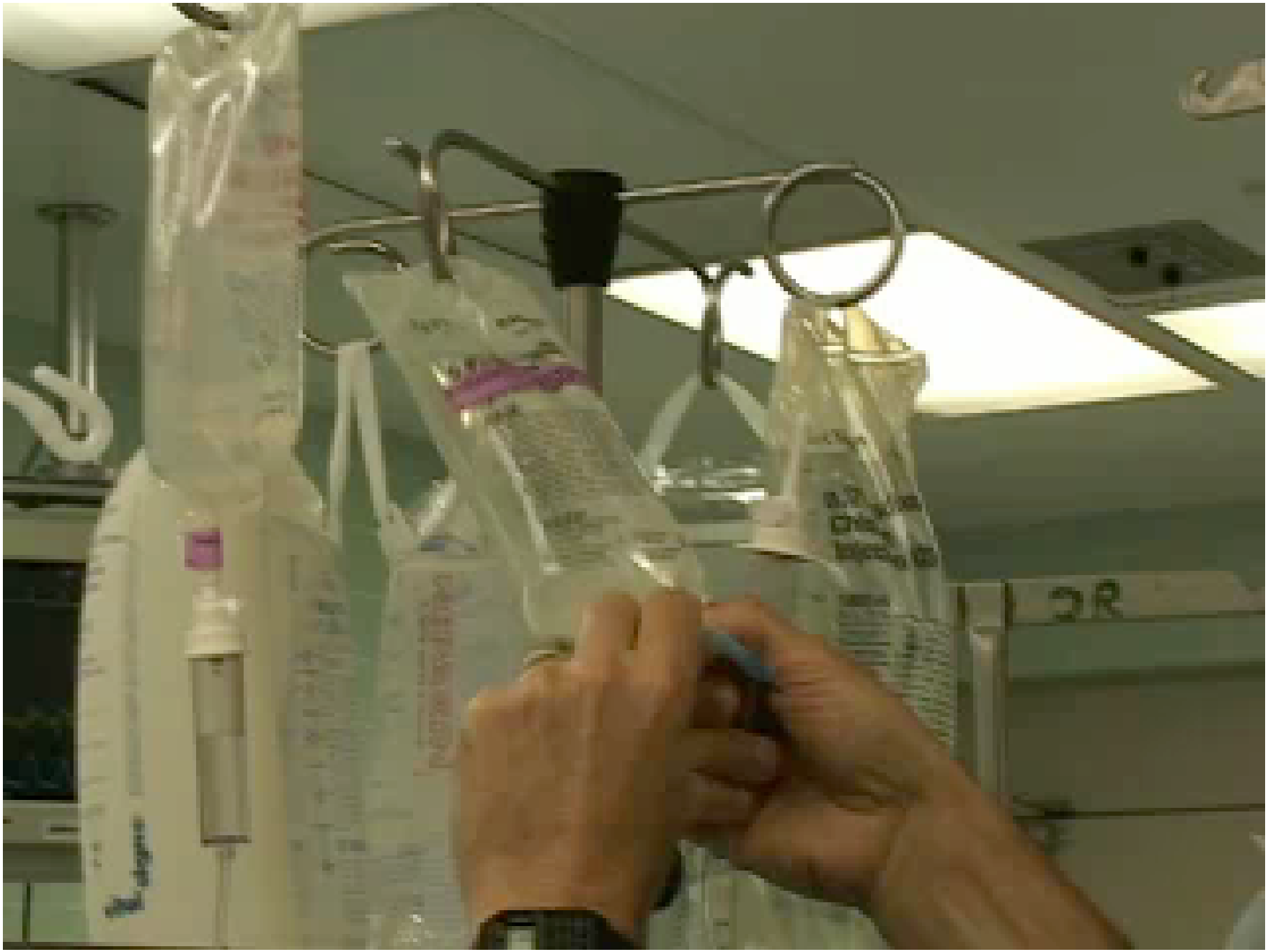
- HIT implementation is far more complex and challenging than usually appreciated.
- Resources (especially staff time) allocated for HIT implementation are always inadequate.
- Early problems and disappointments are inevitable.
- Promised features and capabilities are rarely (if ever) available when expected.

Critical Implementation Issues

- **Getting the right information to the right person(s) at the right time**
- **Maintaining data quality**
  (Garbage In –> Garbage Out)
- **Providing adequate user training**
- **Assuring security and privacy**
  (both patients and clinicians)

Incentivizing Failure

- Changing the status quo.
- Front-line staff not invested in plan.
- "What's in it for me?"
- Workflow inefficiencies and increased clinician workload.
- Misplaced priorities (efficiency vs. safety)
- Big Brother is watching!



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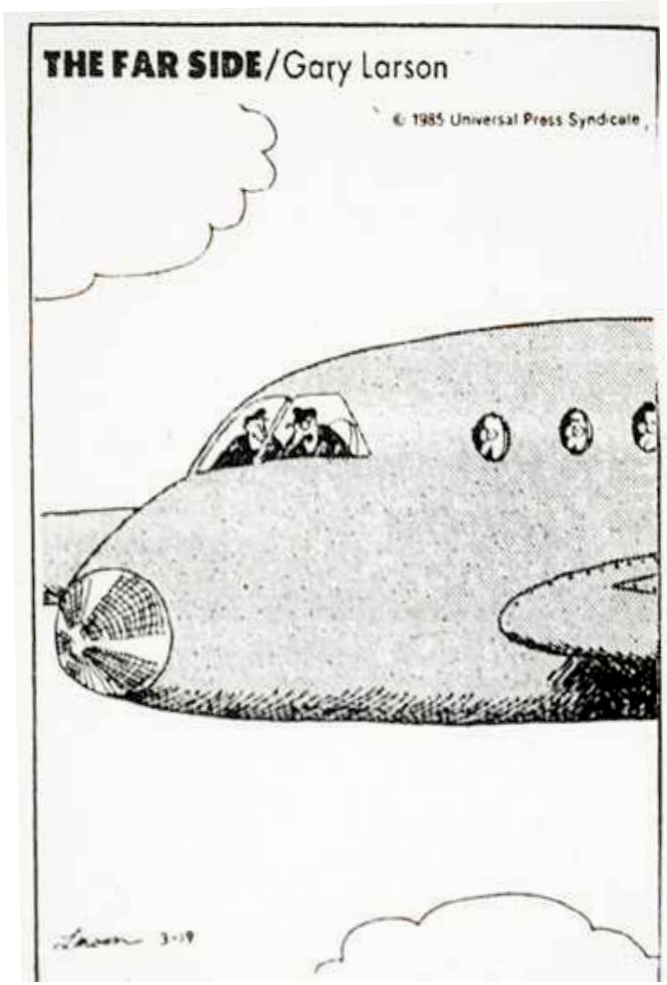

The fuel light's on, Frank! We're all going to die! … Wait, wait … Oh, my mistake – that's the intercom light.

The vast majority of adverse events associated with the use of technology are due to poor user interface design

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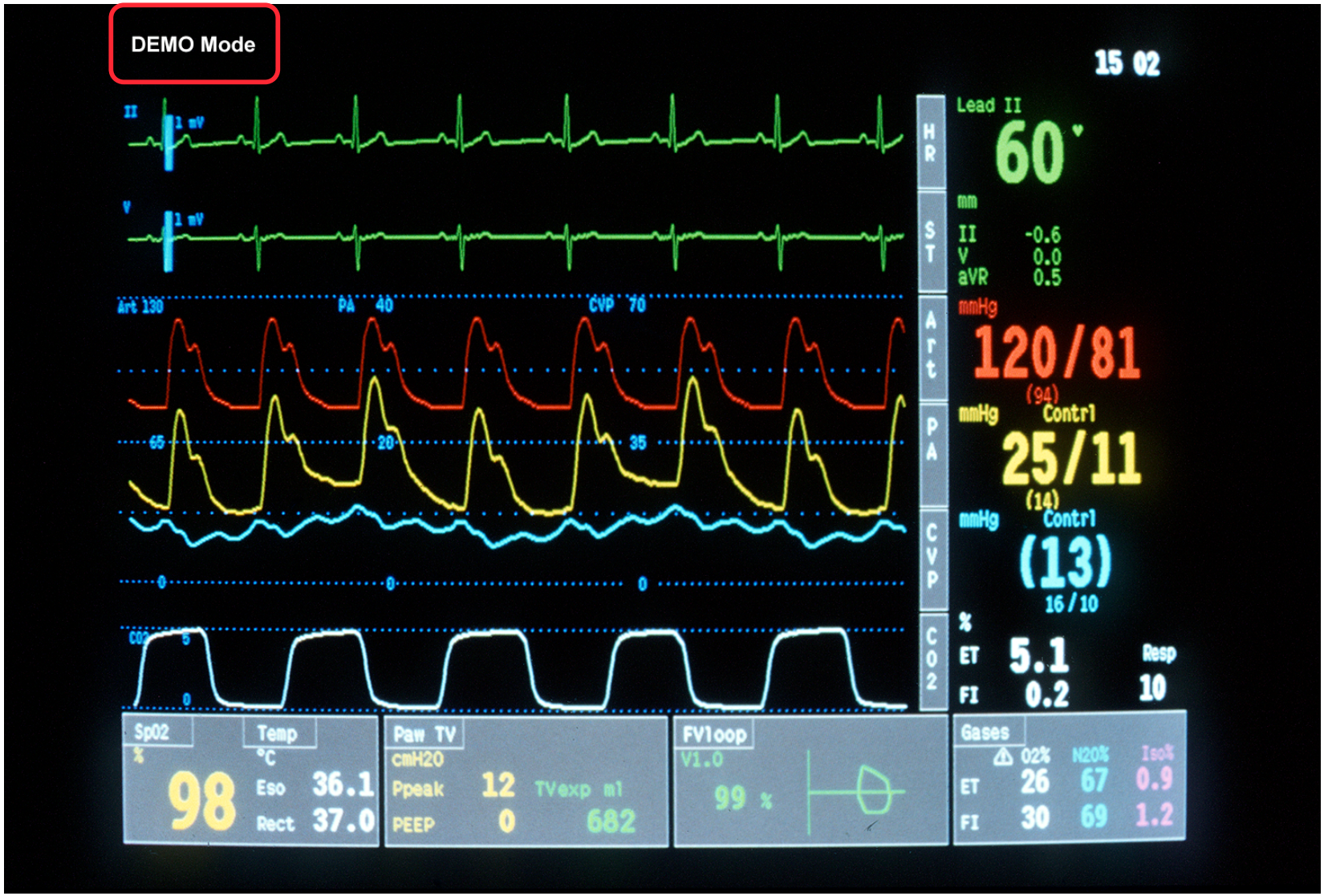

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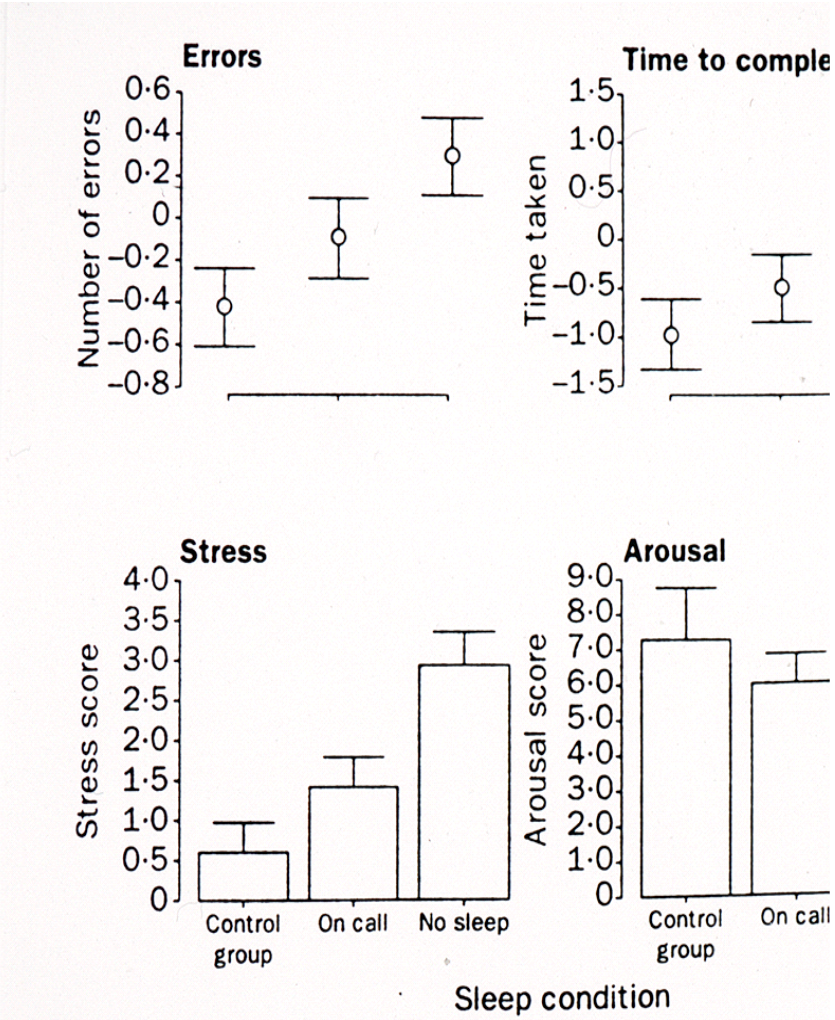
When sleep deprived, surgical residents are slower and make more errors.



Taffinder NJ, et al. Effect of sleep deprivation on surgeons' dexterity on laparoscopy simulator.

THE LANCET • Vol 352 • October 10, 1998

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Why has HIT not delivered?

Deepest Answers

- **Defective healthcare infrastructure.**
- **Failure to understand the nuances of healthcare, especially at the sharp-end.**
- **Greatest benefits and needs are at the *margins* (where technology is the least reliable and it's the most difficult implement).**

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Case 11418: Factitious Hypotension

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Designing Effective HIT Implementations

- Partner with HIT developer … don't settle for off-the-shelf solution – must be customized to your hospital.
- Allocate sufficient resources (especially staff time!)
- Beginning planning before make a purchase decision.
- Understand clearly and in great detail your use environment(s) and your end-users' actual needs.
- Include end-users in all design decisions, beginning at the earliest stage of the process.
- Iterative design and functional testing.
- Expect problems and use as information for re-design

THE REAL REASON MOST HIT IS NOT SUCCESSFUL

MEDIOCRITY

IT TAKES A LOT LESS TIME
AND MOST PEOPLE WON'T NOTICE THE DIFFERENCE
UNTIL IT'S TOO LATE.

PESSIMISM

Every Dark Cloud Has a Silver Lining,
but Lightning Kills Hundreds of People Each Year Who Are Trying to Find It.

Technology can introduce new modes of system failure

- **Poor usability** (clinician misses or misreads laboratory result on crowded screen)
- **Tighter coupling** (a single error is propagated to many patients very quickly)
- **Over reliance on technology** (False negatives lead to inappropriate or inadequate treatment)
- **Technology failure** (system crashes but back-up systems are inadequate)